

Savannah River Site Citizens Advisory Board

Recommendation #303

Disposition of Spent/Used Nuclear Fuel (SNF/UNF) from L-Basin through H-Canyon
Considering the Plutonium Processing Impacts Likely to be Encountered

Background

Both defense and commercial nuclear waste have been stored in interim sites across America since the 1950s, without a consent-based process. The Savannah River Site (SRS) has served as one such site. It has become clear that a disposition path for the radioactive materials stored at SRS will not have a disposition path for many more years.

The 1982 Nuclear Waste Policy Act (NWPA), amended in 1987 to designate Yucca Mountain as the national site to be developed for America's permanent waste repository, has been bypassed. The Obama administration has directed the Department of Energy Secretary, Dr. Steven Chu, to withdraw its application from the Nuclear Regulatory Commission (NRC) for licensing the site for that function.

Following the withdrawal action for licensing Yucca Mountain, the President established a Blue Ribbon Commission (BRC) for the purpose of identifying alternatives to Yucca Mountain that could accommodate America's current and future nuclear waste. The BRC released its final report in July of 2012 with general recommendations that must be evaluated by various relevant federal and state agencies. Recommendations emerging from those evaluations will then be subject to consideration by effected agencies in order to select actions that may constitute a national waste management program. The BRC also included the recommendation that actions to establish interim or permanent repositories be consent-based.

Compounding the issue is the likelihood that Yucca Mountain could again come under consideration as a permanent deep geologic deposit for America's commercial and defense nuclear waste with any administrative policy change. A recent Government Accountability Office found that there appears to be no scientific evidence supporting claims that the Nevada site is geologically inappropriate as a national waste repository.

Further compounding the issue is the history of consent-based attempts to site nuclear waste storage systems in America's states, Indian Reservations, and other communities. A Nuclear Negotiator Office was established through the 1987 amendment of the 1982 NWPA congressional act. That office approached a series of state governments, Indian Reservations and economically depressed communities with financial incentives to volunteer for nuclear waste storage. All offers were rejected and the Nuclear Negotiator Office was closed in 1994.

Discussion

The Savannah River Site (SRS) has been the interim storage site for defense waste (in the form of DWPF canisters) and other nuclear materials (both domestic and foreign Spent/Used Nuclear Fuel-SNF/UNF) for half a century. A series of disposition campaigns to process the SNF/UNF have been considered, with some funded and implemented, but without being integrated into a

cradle to grave nuclear waste management system and without a federal repository to receive shipments of the processed waste. None of the SRS storage programs have been consent-based.

One system, the Defense Waste Processing Facility, vitrifies radioactive waste from the SRS tank streams. The vitrified waste is then stored in an interim site that houses the resultant glass logs in steel canisters surrounded by sub-surface concrete vaults.

Another system involves utilizing the decommissioned L Reactor cooling pool, holding 3.4 million gallons of water, as an interim wet storage site for 15,000 assemblies containing both domestic and foreign research reactor spent nuclear fuel. The pool now contains 13,000 assemblies. Current planning for the management of L-Basin radioactive materials includes processing certain SNF/UNF through H-Canyon where the highly enriched uranium is captured (and reused) and the waste is processed through the High Level Waste System to the DWPF where it is deposited in canisters in a glass matrix). There is a concern that this material is not scheduled to be processed in the H-Canyon. If the delay continues the H-Canyon may not be available. The process time for this SNF/UNF is on the order of 10 years and there is a valid question whether the H-Canyon will be operated long enough to complete the materials in the L-Basin. The H-Canyon operability remains subject to such intervening variables as administrative policy changes and congressional funding.

Additionally, as an interim wet storage site, L-Basin is reaching full capacity. There is an ongoing consideration for expanding storage capacity in the basin. The racks into which the assemblies are stacked must be designed around a fixed geometry for spacing the radioactive contents to control criticality. There are 3,650 available positions, with 3,174 positions filled and remaining space to add around 15 additional racks (or 450 storage positions) in the pool. Any rack designs must be seismically qualified in case of earth movement (quakes).

Like all federal nuclear systems, L-Basin funding is subject to administrative and congressional discretion for operations funding. A 2011 study on fuel and basin life extension was conducted by the Savannah River National Laboratory which concluded that the fuel presently in the basin can be safely stored for an additional 50 years, contingent upon the continuation of existing management activities and implementation of several augmented program activities. The management and augmentation activities include periodic examination of the bundled fuel assemblies, assessment of fuel in isolation containers, and basin concrete assessment. There must also be a continuation of the basin water chemistry, corrosion evaluation, structural integrity evaluations, aging facility management assessments and infrastructure maintenance. These requirements for continued storage of spent fuels face potential challenges. Structural integrity of both fuel and their containers is a constant challenge. Another constant challenge to the L-Basin pool is the risk of basin contamination and requisite cleanup. There is presently such an invasion under study. The costs of operating L-Basin are currently around \$40 million per year.

While consideration is also ongoing for dry storage alternatives at L-Basin, questions have evolved on the efficacy of dry storage considering such safety issues as terrorist threats. Internationally, materials that have been selected for dry-cask storage have been cooled for several years before entering the system.

Considering the above cited problems for continued on-site storage of SNF/UNF, their costs, and the likelihood of a national nuclear waste repository becoming available in the near future, the most practical solution for dispositioning radioactive materials from L-Basin is to utilize H-Canyon process operations to process it through H-Canyon for injection into the high level waste stream entering the DWPF vitrification system. Processing the materials through H-Canyon has

the advantage of utilizing that unique facility and its skilled personnel for several years. Further, converting the L-Basin SNF/UNF fission products into vitrified glass logs has several advantages. They are more easily and safely stored than maintaining SNF/UNF in any storage configuration. The vitrified material is less subject to threat by terrorist actions. Finally, as a result of the other advantages, the option of canister storage for vitrified materials is a more pragmatic and practical option than extended wet storage of SNF/UNF or wet storage of SNF/UNF supplemented by dry-cask systems.

There have been some complications to the possible processing of the SNF/UNF in H-Canyon due to a preferred alternative recently published in an on-going Supplemental Environmental Impact Statement for the Disposition of Surplus Plutonium by the National Nuclear Security Administration. It appears likely that H-Canyon will now be used partially for processing some of the plutonium for use in the Mixed Oxide Facility. If this is the case it is not clear to what extent the H-Canyon could process the SNF/UNF on-site or how long it would take.

However, it seems imprudent to continue to keep SNF/UNF in a somewhat vulnerable storage configuration when such an attractive and reasonably affordable option is available to configure it into the most stable, technically advanced, and attractive configuration possible. Further, it is noted that maintaining H-Canyon with no processing done at all costs \$150 M per year while operating at full capacity only costs \$170 M per year. From a relative standpoint the costs increases for full operations seem modest.

Recommendations

Given the disadvantages of the current wet storage system, processing obstacles, lack of an available national repository for years to come, need for additional storage space facing SNF/UNF on the SRS site, and all the associated costs, it is recommended that DOE:

1. Authorize and fund the processing of L-Basin SNF/UNF in H-Canyon as a matter of urgency considering the considerable length of the SNF/UNF campaign and the possible limited life of H-Canyon.
2. Reassess the SNF/UNF processing time and capacities for H-Canyon considering that plutonium will likely be processed in H-Canyon (as a result of a related plutonium disposition program) and may possibly extend the end point for H-Canyon operations.
3. Establish the length of the processing campaign of the SNF/UNF in H-Canyon considering the parallel processing needs of the plutonium being processed for the Mixed Oxide Program.
4. Develop a System Plan to document the revised H-Canyon schedule and the impact on the DWPF schedule.
5. Continue processing the L-Basin SNF/UNF through H-Canyon after the vulnerable fuels have been processed.